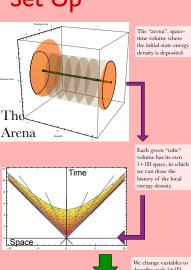


THE CLUB SANDWICH MODEL







Proper Time

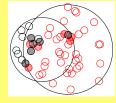
We change variables to describe each 1+1D space in rapidity vs proper time, making the Bjorken assumption that fluid position and rapidity are highly correlated.

Now the task is to identify a 1-D function dmT/dY, at each transverse position.

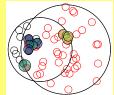
A general framework for modeling initial energy densities in 3-D

Paul Stankus Oak Ridge Natiaonal Lab

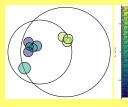
Method



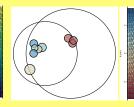
Standard Glauber/Wounded-Nucleon calculation; sub-divide each participant based on how many partners it hits.



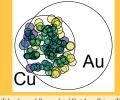
For each participant-fragment pair we establish one *tube*, at energy-weighted average transverse position.



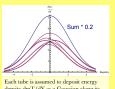
Each tube has a total energy (shown as area) and total momentum (shown a color), conserved from the participar



Each tube is also described by a net

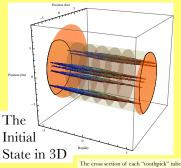


Tubes from a fully-populated Cu+Au collision. The "twist", ie a gradient in Pz, is clearly visible from the Cu-going (blue) to the Au-going (yellow) directions.



length, centered on its net rapidity and with width from Carruthers, '73

 $\sigma^2 = \ln(\sqrt{\hat{s}}/2m_N)$



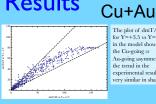
is proportional to its local energy density dmT/dY at that rapidity/location.



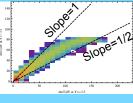
Once the tubes are defined, we can draw the initial energy deposit pattern on any slice of constant energy and constant proper time. This is the full description of a classical object.

Results

Rapidity



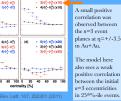
The plot of dmT/dy for Y=+3.5 vs Y=-3.5 in the model shows the Cu-going vs Au-going asymmetry: the trend in the experimental results is very similar in shape.



In the model the correlations of n=2 and n=3 eccentricities at $\eta=0, 3.5$ at the $25^{\text{tho}}\%$ -ile (right) are much more similar.

Experimentally the measured n=2 event planes are much more strongly correlated than the n=3, between $\eta=0$ and $\eta=3.5$ in mid-central Cu+Au collisions (left).

Au+Au



Development

The "Club Sandwich" picture can be generalized to any 1-D function dmT/dY at each transverse position, including longitudinal fluctuations; the Gaussian "toothpicks" shown here are just a simple, parameter-free guess.

Forward-mid and forward-backward correlation measurements can directly constrain any model of 3-D energy deposit, well beyond measurements confined to mid-rapidity.

